REMARKS

This is the first office action. Claims 1-159 are pending with this response. Claims 1-159 are rejected by this office action.

35 U.S.C. §112

Claims 25-159 are rejected by the Office Action under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. The Office Action states that "In view of the wording of the claims language and the large number of claims, which render it difficult to determine the matter for which protection is sought. [sic] In page 1, line 19 through page 2, line 11 of the specification has clear language that reflects itself in claims 1-24 of the Application but do not relate itself to claims 25-159. [sic]"

Applicants respectfully disagree. The cited section corresponds to the "Background of the Invention" and is not intended to provide exhaustive support of the claimed invention of the present application. In accordance with MPEP §608.01(g), the "detailed description, required by CFR 1.71, MPEP §608.01, must be in such particularity as to enable any person skilled in the pertinent art or science to make and use the invention without involving extensive experimentation." The *Detailed Description* (pp. 20-91) of the present application complies with this requirement. For example, the specification from page 36, line 1 to page 90, line 25 describes "Second-Generation Embodiments and Techniques" and supports the enablement requirement for claims 25-159. As an example, claim 25 claims:

A chaotic transmitting circuit, comprising:

an oscillator circuit;

a resistor coupled to the oscillator circuit;

a chaotic circuit coupled to the oscillator circuit through the resistor, wherein the chaotic circuit exhibits a current-voltage characteristic shape having a slope that intersects a load line defined by the resistor and provides an equilibrium point about which a voltage oscillates chaotically; and

a switch coupled to the chaotic circuit, wherein the switch changes a nonreactive resistive value in the chaotic circuit in accordance with an information signal and thereby causes the first equilibrium point to shift to a shifted first equilibrium point.

Claim 25 is supported, for example, by the *Detailed Description* from page 37, line 26 to page 38, line 11 and by Figures 19A and 19B. Additionally, the *Detailed Description* of the present application enables one skilled in the art to make and use the invention as claimed in claims 26-159. For example, Figure 19B shows "a diode circuit that exhibits a negative piecewise linear resistance", as claimed in claim 26. As another example, Figure 13 and the associated description (page 59, lines 5-17) show the elements of independent claim 46 including "a resistor coupled to the oscillator" (corresponding to resistor 225), "a chaotic circuit comprising a negative resistance, wherein the chaotic circuit is coupled to the oscillator circuit through the resistor" (corresponding to resistor 284), "an isolation amplifier coupled to the oscillator" (corresponding to amplifier 1308), "a filter coupled to the output of the isolation amplifier that limits a frequency bandwidth present at the chaotic circuit" (corresponding to filter 1309), and "a means for modulating a circuit element of the chaotic transmitter in accordance with an information signal" (as shown in Figures 19D and 19E). As another example, Figure 38 and the associated description (page 75, line 28 to page 77, line 26) show the elements of independent claim 110 including "a plurality of 2^N transmitters of which generates a chaotic strange attractor signal that is distinct from others in the plurality of 2^N transmitters" (corresponding to transmitters 4020-4050), "a switch which, in response to receiving a time-varying N-bit code representing a unit of information, selects a corresponding one of the plurality of 2^N transmitters" (corresponding to switch 4060), and "a transmission circuit that transmits the selected chaotic strange attractor signal across a transmission channel" (corresponding to circuit 4070). Thus, the specification complies with the enablement requirement, and Applicants request for reconsideration of claims 25-159.

Claims 25-159 are rejected by the Office Action under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which applicant regards as the invention. The Office Action states that the Examiner has difficulty relating the language of claims 25-159 to page 1, line 19 through page 2, line 11 of the specification, which states that "the present inventors have discovered a technique for modulating the transmitting signal in a manner that results in much faster signal stability, thus reducing the amount of time required to synchronize the receiver and increasing the modulation bandwidth dramatically." Claims 25-159 do particularly point and distinctly claim the subject

matter which Applicants regard as the invention. Examiner expresses difficulty relating claims 25-159's language to the specification. The specification of the present application, for example, states (page 36, lines 25 to page 37, line 5):

> In order to overcome the aforementioned limitations, the present inventors have discovered that by modulating certain characteristics (including nonreactive components) of the transmitting circuit, the modulation bandwidth can be increased by approximately 200%. In some embodiments, this effect occurs as a result of changing one or more non-reactive resistive values in the transmitter circuit, which allows the transmitter to smoothly transition between strange attractors, which causes the receiver to go into and out of synchronization almost instantly without generating noise. Various transmitter circuits according to the second-generation embodiments can be used with first-generation receivers described above. Other features, improvements and advantages of the second-generation system will become apparent through the following description and accompanying figures.

The language in claims 25-159 supports "a means to reach the above remarks in the specification." Claims 25-159 are definite in pointing out and distinctly claiming subject matter which Applicants regard as the invention, and thus Applicants request reconsideration.

35 U.S.C. §102

Claims 1-159 are rejected under 35 U.S.C. 102(b) as being anticipated by "Chaos Shift Keying Communications System Using Self-Synchronization Chua Oscillators" (Pinknet, et al.). Applicants respectfully disagree. Claim 1, for example, includes the step (element) of "**changing**, in response to an information signal, **a non-reactive resistive value** in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". (Emphasis added.) As exemplified in Figure 19D of the present application, Pinknet does not teach or even suggest this element. Pinknet does teach (Page 1021, left column. Emphasis added.):

> We have chosen to change only K, which will alter the fixed points and nonlinear breakpoints of the transmitter while keeping the Lyapunov exponents constant. K is easily changed using **the clipping circuit that alters V_{br}**.

However, Pinknet does not teach the element of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". In order for Pinknet to anticipate claims 1, Pinknet "must teach every element of the claim" in accordance with MPEP

§2131. Pinknet does not teach every element. The above discussion is applicable to independent claims 15, 25, and 38. Claims 2-14, 16-24, 26-35, and 39-40 depend from the above independent claims.

Also, independent claims 36, 41, 42, 44, 45, 54, 55, 56, 57, 75, 79, 83, 85, 95, 96, 103, 107, 110, 111, 116, 123, 135, 137, 144, 147, 148, 152, 156, and 158 include other elements that are not recited in the Office Action and that are not taught or even suggested by Pinknet. For example, claim 45 includes the element of "a filter coupled to the output of the isolation amplifier that limits a frequency bandwidth present in the chaotic circuit", which is not shown in Pinknet. As another example, claim 56 includes "a first filter, coupled to the input terminal, which filters the modulated chaotic signal that produces a filtered modulated chaotic signal", which is not shown in Pinknet. As another example, claim 152 includes the element of "an attenuator circuit, coupled to the direct current power supply, wherein the attenuator circuit attenuates a signal present at the direct current power supply prior to being introduced into the communications channel", which is not shown in Pinknet. The remaining claims depend from the above independent claims. Thus, Applicants request reconsideration of claims 1-159 for at least the above reasons. If this rejection is maintained, Applicants respectfully request that the locations of the following elements be specifically identified: "a filter coupled to the output of the isolation amplifier that limits a frequency bandwidth present in the chaotic circuit" and "an attenuator circuit, coupled to the direct current power supply, wherein the attenuator circuit attenuates a signal present at the direct current power supply prior to being introduced into the communications channel". Applicants also request an explanation as to how Pinknet teaches "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space".

Claims 1-159 are rejected by the Office Action under 35 U.S.C. 102(b) as being anticipated by "Secure Communication via Chaotic Parameter Modulation" (Chua). Applicants respectfully disagree. Claim 1, for example, includes the element of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". Chua does not teach or even suggest this element. Chua does show the v-i characteristics of

Chua's diode in Figure 1b of Chua but does not teach the step (element) of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". However, the v-i characteristics of the diode shown in Figure 1b are static. Chua does not teach every element. The above discussion is applicable to independent claims 15, 25, and 38. Claims 2-14, 16-24, 26-35, and 39-40 depend from the above independent claims.

Also, independent claims 36, 41, 42, 44, 45, 54, 55, 56, 57, 75, 79, 83, 85, 95, 96, 103, 107, 110, 111, 116, 123, 135, 137, 144, 147, 148, 152, 156, and 158 include other elements that are not recited in the Office Action and that are not taught or even suggested by Chua. For example, claim 85 includes the element of "using the modulated chaotic signal and an output of the oscillator circuit to drive a second chaotic circuit tuned to a second strange attractor", which is not shown in Chua. The remaining claims depend from the above independent claims. Thus, Applicants request for reconsideration of claims 1-159 for at least the above reasons. If this rejection is maintained, Applicants respectfully request that the locations of the following element be specifically identified: "using the modulated chaotic signal and an output of the oscillator circuit to drive a second chaotic circuit tuned to a second strange attractor". Applicants also request an explanation as to how Chua teaches "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space".

Claims 1-159 are rejected by the Office Action under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,291,555 (Cuomo). Applicants respectfully disagree. Claim 1, for example, includes the element of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". Cuomo does not teach or even suggest this element. Cuomo does teach (Abstract. Emphasis added.):

> A chaotic transmitter (100) operates according to preselected chaotic protocols, such as a set of Lorenz equations. **Modulation is accomplished by modifying a predetermined parameter of the set of chaotic Lorenz equations with a message signal, thereby producing a spread spectrum chaotic transmitted signal.** A corresponding receiver (200) reconstructs a synchronizing drive signal, which is used by a demodulator (412) of the receiver (200) to detect the message signal.

However, Cuomo does not teach the element of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". The above discussion is applicable to independent claims 15, 25, and 38. Claims 2-14, 16-24, 26-35, and 39-40 depend from the above independent claims.

Also, independent claims 36, 41, 42, 44, 45, 54, 55, 56, 57, 75, 79, 83, 85, 95, 96, 103, 107, 110, 111, 116, 123, 135, 137, 144, 147, 148, 152, 156, and 158 include other elements that are not recited in the Office Action and that are not taught or even suggested by Cuomo. For example, claim 103 includes the element of "in response to receiving a time-varying N-bit code representing a unit of information, selecting a corresponding one of a plurality of 2^N transmitters each of which generates a chaotic strange attractor signal that is distinct from others in the plurality of 2^N transmitter", which is not shown in Cuomo. As another example, claim 57 includes the element of "an interface circuit that couples the chaotic transmitter and chaotic receiver to a radio-frequency telephone circuit, wherein the radio frequency telephone circuit communicates with a ground-based telephone network through one or more radio frequency transmission stations", which is not shown in Cuomo. As another example, claim 135 includes the steps (elements) of "applying the signal applied to the oscillator in step (2) to a slope detector circuit that exhibits a current slope function opposite in polarity to that of the load line and which intersects the load line at an equilibrium point corresponding to an equilibrium point of a transmitter" and "generating a difference signal representing a difference between the chaotically modulated signal received in step (1) and the output of the slope detector circuit", which are not shown in Cuomo. The remaining claims depend from the above independent claims. Thus, Applicants request reconsideration of claims 1-159. If this rejection is maintained, Applicants respectfully request that the locations of the following elements be specifically identified: "in response to receiving a time-varying N-bit code representing a unit of information, selecting a corresponding one of a plurality of 2^N transmitters each of which generates a chaotic strange attractor signal that is distinct from others in the plurality of 2^N transmitter", "an interface circuit that couples the chaotic transmitter and chaotic receiver to a radio-frequency telephone circuit, wherein the radio frequency telephone circuit communicates with a ground-based telephone network through one or more radio frequency transmission stations", "applying the

claims 1-159. If this rejection is maintained, Applicants respectfully request that the locations of the following elements be specifically identified: "a chaotic circuit comprising an upper slope circuit that implements a first current-voltage function in an upper quadrant of a current-voltage response plane and a lower slope circuit that implements a second current-voltage function in a lower quadrant of the current-voltage response plane, wherein the first and second current-voltage functions have a different voltage offset, and wherein the upper and lower slope circuits cooperate with the oscillator circuit to generate a local chaotic signal", "a synchronizing circuit, coupled to the oscillator circuit and the chaotic circuit, wherein the synchronizing circuit detects differences between the modulated chaotic signal at the input terminal and the local chaotic signal", and "a detector coupled to the synchronizing circuit which detects periods of synchronization and non-synchronization". Applicants also request an explanation as to how Tresser teaches "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space".

35 U.S.C. §103

Claims 1-159 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admittance of Prior Art (AAPA). The Office Action recites the specification (page 1 and page 2, lines 1-5) "that the modulations of carrier signals for transmission between two points is well known including chaotic signal." The specification states (Page 1, lines 19-26. Emphasis added.):

> **Techniques for modulating carrier signals in order to transmit information between two points are well known.** In systems employing frequency modulation, for example, a carrier signal is modulated by changing the frequency of the signal in accordance with an information signal such as a human voice. Amplitude-modulated systems change the amplitude of a fixed-frequency signal in accordance with an information signal. Other modulation techniques have been developed over the years to optimize transmission characteristics, to optimize signal bandwidth, and to overcome noisy transmission environments.
>
> So-called "chaotic" signals provide a particularly interesting, simple, and useful means of modulating information signals in a manner that can increase noise immunity and reduce the power levels needed to transmit information. As explained in the **aforementioned application**, which is bodily incorporated herein, these signals can be modulated in various ways to transmit information. The modulation bandwidth available when using such techniques, however, has been determined to be generally limited to 10 to 15% of the tank circuit frequency in the transmitting circuit. This limitation is believed to be due to the

> fact that changing lump parameters in the transmitter causes a certain amount of settling time before the receiver can synchronize with the changed transmitter parameters.

The above statement does not include the phrase "including chaotic signal". Moreover, Applicant is referencing the "aforementioned application." The present application is a continuation-in-part of commonly-owned, copending U.S. application serial number 09/116,661, entitled "Communications System Using Chaotic Synchronized Circuits," filed on July 17, 1998 and naming as inventors Daniel E. Hinton, Sr. and Aaron Budgor. The Office Action states that "by Applicant's admittance in absent [absence] of the above limitations in claim language the claims 1-159 only states prior art as Applicant has mentioned in page 1 and 2 of the specification". The Office Action does not establish a *prima facie* case of obviousness. Claim 1, for example, includes the elements of "generating a chaotic carrier signal that causes a voltage to oscillate chaotically about a first equilibrium point in a current-voltage phase space of a circuit that exhibits a current-voltage characteristic curve on which the first equilibrium point falls" and "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space". The Office Action does not provide a teaching that can be combined with the cited teaching to provide the elements of claim 1. The above discussion is applicable to the remaining claims. Thus, Applicants request for reconsideration of claims 1-159.

signal applied to the oscillator in step (2) to a slope detector circuit that exhibits a current slope function opposite in polarity to that of the load line and which intersects the load line at an equilibrium point corresponding to an equilibrium point of a transmitter", and "generating a difference signal representing a difference between the chaotically modulated signal received in step (1) and the output of the slope detector circuit". Applicants also request an explanation as to how Cuomo teaches "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space".

Claims 1-159 are rejected by the Office Action under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,064,701 A (Tresser, et al.). The Office Action has not shown anticipation of claims 1-159 by Tresser. The Office Action states:

> Tresser et al disclose a method, a chaotic transmitting circuit, a non-linear circuit element, a chaotic communication system, a chaotic receiver and transmitter, a chaotic telephone device, a method of demodulating a signal modulated according to a chaotic trajectory shift-keying technique, an apparatus and a method of recovering information transmitted through a communication channel wherein generating a chaotic carrier signal that causes oscillation of a voltage about first equilibrium point and changing in response to an information signal in a non reactive value in the circuit, shifting to a shifted equilibrium point in the current-voltage phase space and oscillating between two equilibrium points wherein the current-voltage comprising of three linear segments and all limitations of claims 4-159 (see abstract;fig.2-8 and col. 3-7).

In accordance with MPEP §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, ether expressly or inherently described, in a single prior art reference." The Office Action has not shown correspondence to any element of the rejected claims to the teachings of Tresser. Claim 1, for example, includes the element of "changing, in response to an information signal, a non-reactive resistive value in the circuit and thereby causing the first equilibrium point to shift to a shifted first equilibrium point in the current-voltage phase space", which is not shown in the abstract, figures 2-8, or columns 3-7 as cited by the Office Action. Similarly, claim 44 includes the element of "a gain control amplifier coupled to the output of the oscillator subsystem", which is not shown in the cited sections of Tresser. Applicants respectfully request that the Examiner specifically identify where the claimed elements are alleged to be found in Tresser, et al. Thus, Applicants request for reconsideration of

Conclusion

Favorable reconsideration of this application is respectfully requested. The Examiner is invited to contact the undersigned should it be deemed necessary to facilitate prosecution of the application.

Respectfully submitted,

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